

### **ABSTRACT OF THE DISCLOSURE**

A system and method for measuring a voltage in a body part are described. The system includes a multiplexing unit, and N body leads for electrically connecting the multiplexing unit to the body part. The system also includes a controller switching unit for allowing a current to flow through the  
5 body part between two body leads,  $n_1$  and  $n_2$  of the N body leads, and a resultant voltage to be measured between two body leads,  $n_3$  and  $n_4$  of the N body leads, where  $n_1 \neq n_2$  and  $n_3 \neq n_4$ , but where  $n_1$   $n_2$   $n_3$  and  $n_4$  need not otherwise be distinct.